

Chotts. The measures taken last year on the Algerian side have been verified. The same level has been found for the connecting station with an immaterial difference of 2.80 metres in favour of the operation. The altitude at Gabes is only 46 metres, which is no obstacle to the channel being opened. Every objection raised by an Italian Commission has been set aside. MM. d'Abbadée and de Lesseps promised their help and testified their satisfaction.

THE half-yearly general meeting of the Scottish Meteorological Society will be held to-morrow. The business before the meeting will be—1. Report from the Council of the Society. 2. Notice as to observations of the velocity of the wind at different heights, by Thomas Stevenson, F.R.S.E., F.G.S. 3. Meteorological Register kept by James Hoy, at Gordon Castle from 1781 to 1827, communicated to the Society by His Grace the Duke of Richmond and Gordon, with remarks thereon by Mr. Buchan, secretary. This, we believe, is a very valuable register.

MR. E. F. FLOWER has published "A Sequel" to his much-needed pamphlet on "Bits and Bearing Reins." We are glad to see that his efforts to abolish the useless and cruel bearing-rein, and to introduce a rational and humane, and therefore scientific, way of managing horses has been largely successful. We cannot see how any man who wishes to be "merciful to his beast" can, after reading Mr. Flower's pamphlet, persist in the use of the bearing-rein, which after all is quite unnecessary, and no doubt tends to make a horse contract vices.

Nos. 4 and 5 of the *Iowa Weather Review* give a very good summary of the weather of the State of Iowa during December, January, and February last, dividing the season into nine decades. The winter was unusually mild, being 10°·5 above the average of Iowa winters, while during the third decade of December the excess rose to 19°·7. Less than an inch of rain fell in the north-west of the State, but in the central countries the fall was large, amounting to 9.60 inches at Davenport. Several interesting practical tables are added showing the days of thaw when the maximum exceeded 32°, days of frost when the minimum fell below 32°, and days of cold when the temperature fell to zero or lower. Sudden colds following in the wake of storms are also detailed, together with the barometric rise, and the velocity and direction of the wind, accompanying these great falls of temperature, which form so marked a feature in the climate of America. The alleged change of climate from the cultivation of the soil and the destruction of forests by which the summers, as stated, are becoming warmer and the winters colder, is a question which deserves to be carefully examined.

WE have received "Results of Meteorological Observations made at the Bath Royal Literary and Scientific Institution during the Ten Years ending February, 1875," by the Rev. Leonard Blomefield. The pamphlet, which is an extract from the "Proceedings of the Bath Natural History and Antiquarian Field Club," is a conscientious piece of work, evidently got up with the greatest care. The instruments appear to be fairly placed, except the rain-gauge, which is fixed in a faulty position, viz., at the top of a building. The monthly and yearly mean temperatures have been deduced from the 9 A.M. observations corrected for diurnal range, though it may well be doubted whether "means" can be calculated from observations made at only one hour of the day and whether any diurnal range corrections yet exist applicable to Bath. Some very interesting comparisons are drawn between the climate of Bath and other parts of England, with on the whole a just apprehension on the part of the author of the misleading nature of data when based on the observations of different years. Some of the differences, however, pointed out by Mr. Blomefield, such as the higher temperature of Bath as compared with Exeter during January and

February disappear when a comparison is made from observations taken during the same years at each place, or from results obtained by the method of differentiation. Among the interesting results arrived at is the higher temperature of the river as compared with that of the air at Bath amounting to 2°·5 on a mean of the year, rising in June to 4°·6, and falling in February to 0°·5. In many respects the pamphlet is a valuable contribution to the meteorology of the south-west of England.

DR. H. HAMBERG, Assistant Professor of Meteorology at the University of Upsal, has written in the "Proceedings of the Royal Academy of Sciences," Stockholm, a very interesting paper on the development of the barometric minimum accompanying the thunderstorms which occurred in Sweden and Norway from July 14 to 20, 1872. From the data before him, Dr. Hamberg concludes that the barometer fell most where the sky was cloudless, and that the fall of heavy rain was generally attended with a rise rather than a fall of the barometer, much in the same way as Dr. Hann has shown to take place within the tropics at Batavia. The question is as difficult as it is important in meteorology, and the investigation of the behaviour of the barometer during our summer thunderstorms is likely to lead to most valuable results.

THE additions made to the Royal Aquarium, Westminster, during the past week are as follows:—A large collection of fresh-water fish, including Carp, Bream, Chub, Perch, Roach, and Trout, presented by the Earl of Aylesford; Sand-eels (*Ammodytes lancea*), Gemmeous Dragonettes (*Callionymus lyra*), Lump-fish (*Cyclopterus lumpus*), Five-bearded Rocklings (*Motella mustela*), Sea Bream (*Cantharus lineatus*), a shoal of young Lobsters (*Homarus vulgaris*), hatched in the tanks.

THE additions to the Zoological Society's Gardens during last week include eleven Lined Pheasants (*Euplocamus lineatus*), nine Amherst Pheasants (*Thaumalea amherstiae*), nine Gold Pheasants (*T. picta*) and two Peacock Pheasants (*Polyplectron chinquis*), bred in the Gardens; a Cape Buffalo (*Bubalus caffer*).

SCIENTIFIC SERIALS

THE January number of Reichert and Du Bois-Reymond's *Archiv* opens with the conclusion of L. Dittmer's lengthy communication on double monsters.—Carl Sachs describes and figures the terminations of nerve fibres in certain tendons.—In a long controversial article, Prof. Hitzig defends his own and Fritsch's conclusions with respect to the functions of the cerebrum against Hermann, Braun, Carville, and Duret.—F. Boll's article on the Savian vesicles found in the torpedo about the nasal orifices and between the external edges of the electrical organs and the limb-cartilages, is very interesting, because he demonstrates the existence in their epithelium of spindle-shaped cells corresponding in character to those so commonly found in special sense organs.—Dr. Colasanti, of Rome, gives an account of the results of section of the olfactory nerve in the frog. He finds that there is no consequent alteration in the nutrition or appearance of the olfactory cells or of the peripheral ramifications of the pale nerve-fibres.—Dr. Colasanti, in another short memoir shows that the fertilised hen's egg may be reduced in temperature to from -7° to -10° C. without its vitality being destroyed or in any way interfered with.—Rabl-Rückhard contributes an elaborate account of the brain and cerebral nerves of the black ant (*Camponotus ligniperdus*).

The March number of the *Archiv* contains a very interesting account by P. Guttman of his new experiments on respiration. Investigating the respiratory pause following on inspiration, he found that in vagotomised rabbits this pause does not occur. The possible reasons for this are discussed. In rabbits, in whom apnoea has been produced, it is always found that when the apnoea terminates, an inspiration, not an expiration, is the first phenomenon.—Bernstein and Steiner contribute an important paper on the transmission of contraction and the negative variation in the muscles of mammalia; but the intricacy of the sub-

ject does not admit of a brief abstract.—Another valuable paper on this subject, by Du Bois-Reymond himself, is commenced in this part. It constitutes the second part of his researches on negative variation of the muscular current during contraction, and must be consulted by all workers in this difficult branch of research.—Dr. Wenzel Gruber has five papers, some of considerable length, on various anomalous muscular dispositions. Such papers should be condensed as much as possible.

THE two last numbers of the *Nuovo Giornale Botanico Italiano* are chiefly occupied with Italian botany.—Among papers of more general interest we have a description by A. Mori, of the structure of the wood of *Periploca graca*; and two by Prof. Caruel :—On the flowers of *Ceratophyllum*, in which he describes the peculiar contrivance for the fertilisation of the female flowers, the rigid leaves apparently serving as the channel of transport for the pollen; and observations on *Cynomorium*, in which several points in the structure of the flower are detailed, and the author gives his adhesion to Dr. Hooker's suggestion of a possible genetic connection between Balanophoræ and Haloragææ.

Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie, March 15.—The first article is by Prof. Tomaschek, of Brünn, on mean temperatures as thermal constants for vegetation. The law, formerly pointed out by him, of the dependence of the commencement of blooming, on the height of daily mean temperatures, appears not only not to be shaken, but to be supported by an investigation of the results for the exceptional year 1862.—The next article is by Dr. Hann, on the results of observations on Mount Washington and Pike's Peak. During very cold weather, the change of temperature with height is less than usual, amounting only to about 0.3° C. for each 100 metres, so that the equilibrium of the air vertically must be at such times very stable. The mean decrease with height in the dry climate of Pike's Peak is somewhat greater than in the Alps and at Mount Washington. The daily and monthly ranges are excessive on the elevated plains. Dr. Hann greatly regrets the impracticable form in which the reports have been published, considering the desirability of having the actual observations for Pike's Peak and Colorado Springs, two stations better situated for meteorological purposes than any others in the world, accompanied by the proper data and corrections, which are here wanting.—In the *Kleinere Mittheilungen* we find a description of Redier's self-registering barometer.

Journal de Physique, February.—This number commences with the first part of a paper by M. Jamin, describing his recent researches on magnetism. He gives an account of his methods of observation, offers some theoretical ideas on the nature of magnetism, and discusses magnetic conductivity and distribution in a thin plate.—In a note on meteorology applied to agriculture, M. Marié Davy gives some interesting tables with reference to changes observed in wheat at different dates (the relation of transpired water to the temperature and actinometric degree, the weight of constituent substances, proportion of nitrogen in stalk, &c.). He considers that by the end of May or beginning of June, according to locality, one may generally deduce from meteorological data the probable value of the coming harvest, save in the case of exceptional perturbations, whose injurious action is circumscribed.—M. Duter investigates the distribution of magnetism in circular and elliptical steel plates.

Gazzetta Chimica Italiana, 1876, fascicolo ii.—This part commences with a paper by G. Pisati in continuation of former researches entitled :—On the elasticity of metals at different temperatures. In this paper the author treats of the elasticity of torsion at various temperatures of wires of silver, iron, steel, copper, brass, gold, platinum, and aluminium. The apparatus employed is figured, and the results shown in many cases graphically by means of curves.—On the production of ozone during the evaporation of water, by G. Bellucci.—The modifications of starch in plants, by M. Mercadante.—Synthesis of propyl-isopropyl-benzene, preliminary note by E. Paterno and P. Spica. This hydrocarbon, of which the formula would be

$$\text{C}_6\text{H}_4 \begin{cases} \text{C}_2\text{H}_7 \\ \text{CH}_2\text{C}_2\text{H}_5 \end{cases}$$
 has been prepared by the action of zinc ethyl on cumene chloride. It is a liquid a little lighter than water boiling at about 205°–208°. Other hydrocarbons boiling at a high temperature are also produced during the reaction. The authors propose to continue their researches.—The absence of leucine in the product of the germination of graminaceæ, by M. Mercadante.—The remainder of the part is devoted to abstracts of papers from foreign sources.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, June 15.—“Researches illustrative of the Physico-Chemical Theory of Fermentation, and of the conditions favouring Archebiosis in previously Boiled Fluids.” By H. Charlton Bastian, M.A., M.D., F.R.S., Professor of Pathological Anatomy in University College, London, and Physician to University College Hospital.

The author first calls attention to the fact that no previous investigator has professed to have seen well-marked fermentation set up in urine that had been boiled for a few minutes, if it has thereafter been guarded from contamination. The previous invariable barrenness of this fluid after boiling has been ascribed by germ-theorists to the fact that any organisms or germs of organisms which it may have contained were killed by raising it to the temperature of 212° F. (100° C.).

In executing some of the experiments with urine described in this communication, two chemical agents have been brought into operation under novel conditions, and an ordinary physical influence has been employed to an entirely new extent. In several respects, therefore, these new experiments differ much, as regards the conditions made use of, from those hitherto devised for throwing light upon the much-vexed questions as to the possible origin of Fermentations independently of living organisms or germs, and as to the present occurrence or non-occurrence of Archebiosis.

The chemical agents employed under new conditions in these experiments were *liquor potassæ* and *oxygen*—both of them being well known as stimulants, if not as promoters, of many fermentative processes.

It has been recognised by several investigators of late years that neutral or slightly alkaline organic fluids are rather more prone to undergo fermentation than slightly acid fluids. This fact may be easily demonstrated. As the author pointed out in 1870, if two portions of an acid infusion are exposed side by side at a temperature of 77° F. (25° C.) fermentation may be made to appear earlier and to make more rapid progress in either of them by the simple addition of a few drops of liquor potassæ; on the other hand, if a neutral infusion be taken and similarly divided into two portions placed under the same conditions, fermentation may be retarded, or rendered slower in either of them at will, by the simple addition to it of a few drops of acetic or some other acid.

A neutral or faintly alkaline organic solution can in this way be demonstrated to possess a higher degree of fermentability than an otherwise similar acid organic solution. It seems, therefore, obvious that the changes capable of taking place in *boiled* acid and neutral solutions respectively should also vary considerably. Numerous experiments by different observers have demonstrated the correctness of this inference. Boiled acid infusions guarded from contamination mostly remain pure and barren if kept at temperatures below 77° F. (25° C.), though other infusions similarly treated and similar in themselves, except that they have been rendered neutral by an alkali, will oftentimes become corrupt and swarm with organisms. The latter result follows still more frequently with neutral infusions when they are exposed to a higher generating temperature in the warm-air chamber; and under this stronger stimulus a small number of boiled acid fluids will also ferment.

On the other hand, the influence of oxygen in promoting fermentation has been fully appreciated since the early part of the present century. Formerly an influence was assigned to it as an initiator of fermentation as all-important as some chemists assign to living germs at the present day. But this was a very exaggerated view. In some fluids, as the author has shown, fermentation may be initiated just as freely, or even rather more so, in closed vessels from which the air has been expelled by boiling, as in others in which atmospheric air, and consequently oxygen, is present. The explanation of this fact is probably to be found in the supposition that, in starting the fermentation of these fluids, diminution of pressure may be of as much, or even of more importance than contact with free oxygen. In respect to other organic fluids, however, the influence of oxygen seems decidedly more potent as a co-initiator of fermentation than that diminution of pressure which is brought about by hermetically sealing the vessel before the fluid within has ceased to boil. Urine will be found to be an example of this latter class of fluids.

The physical influence which has been employed in unusual intensity in the present researches is *heat*.